DOCUMENT RESUME

ED 071 236 EC 050 511

AUTHOR	Taylor, Arthur M.; And Others
TITLE	Elaboration Training and Verbalization as Factors Facilitating Retarded Children's Recall. Research Report #24.
INSTITUTION	Minnesota Univ., Minneapolis. Research, Development, and Demonstration Center in Education of Handicapped Children.
SPONS AGENCY	Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.
BUREAU NO	BR-332189
PUB DATE	Dec 71
GRANT	OEG-09-332189-4533(032)
NOTE	41p.
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Childhood; *Educable Mentally Handicapped; *Exceptional Child Research; Imagery; Learning Characteristics; Mediation Theory; Mentally Handicapped; *Paired Associate Learning; Sentences; *Training Techniques; *Verbal Learning

ABSTRACT

The effects of two types of elaboration training (imagery and sentence generation) on the paired associate learning of 32 educable mentally retarded children (aged 9 to 13 years were compared over two levels of verbalization (none and overt). Each S was first tested on a warmup list, then trained to generate elaborations, and finally given two trials to learn a list of 18 noun pairs. Data indicated that overt verbalization would facilitate recall under both types of elaboration training, but not that recall would be better facilitated by imagery than by sentence elaboration. Possible explanations of the general effectiveness of overtly verbalized elaboration were examined. Appendixes included instructions from each of the four treatment conditions. (Author/GW)

ED 071236

FILMED FROM BEST AVAILABLE COPY

BEH
EC

RESEARCH REPORT #24

Project No. 332189
Grant No. OE-09-332189-4533 (032)

ELABORATION TRAINING AND VERBALIZATION AS FACTORS FACILITATING RETARDED CHILDREN'S RECALL[1]

Arthur M. Taylor
University of Minnesota

Marie Josberger
Indiana University

Susan E. Whitely
University of Minnesota

Research, Development and Demonstration
Center in Education of Handicapped Children
Minneapolis, Minnesota

December 1971

EC 050 511

Department of Health, Education and Welfare
U. S. Office of Education
Bureau of Education for the Handicapped

TECHNICAL REPORTS

University of Minnesota Research, Development and Demonstration
Center in Education of Handicapped Children

(Place of publication shown in parentheses where applicable.)

1. D. Feldman. The Fixed-Sequence Hypothesis: Individual Differences in the Development of School Related Spatial Reasoning. Research Report #1, March, 1970.

2. D. Feldman & W. Markwalder. Systematic Scoring of Ranked Distractors for the Assessment of Piagetian Reasoning Levels. Research Report #2, March, 1970. (Educational and Psychological Measurement, 1971, 31, 347-362.)

3. D. Moores. Evaluation of Preschool Programs: An Interaction Analysis Model. Occasional Paper #1. April, 1970. (Keynote Address, Diagnostic Pedagogy, International Congress on Deafness. Stockholm, August 1970, also presented at American Instructors of the Deaf Annual Convention, St. Augustine, Florida, April, 1970).

4. J. Turnure. Reactions to Physical and Social Distractors by Moderately Retarded Institutionalized Children. Research Report #3. June, 1970. Journal of Special Education, 1970, 4, 283-294.

5. J. Turnure, J. Rynders, & N. Jones. Effectiveness of Manual Guidance, Modeling & Trial & Error Learning for Inducting Instrumental Behavior in Institutionalized Retardates. Research Report #4. June, 1970.

6. J. Turnure & M. Walsh. The Effects of Varied Levels of Verbal Mediation on the Learning & Reversal of Paired-Associates by Educable Mentally Retarded Children. Research Report #5. June, 1970. (Study I: American Journal of Mental Deficiency, 1971, 76, 60-67. Study II: American Journal of Mental Deficiency, 1971 in press).

7. R. Martin & L. Berndt. The Effects of Time-Out on Stuttering in a 12-year-old Boy, Research Report #6. July, 1970. (Exceptional Children, 1970, 37, 303-304).

8. J. Turnure, M. Thurlow, & S. Larsen. Syntactic Elaboration in the Learning & Reversal of Paired-Associates by Young Children. Research Report #7, January, 1971.

9. D. Feldman & J. Bratton. On the Relativity of Giftedness: An Empirical Study. Research Report #8. Aug., 1970. (American Educational Research Annual Conference, N. Y., February, 1971.

10. R. Rubin & B. Balow. Prevalence of School Learning & Behavior Disorders in a Longitudinal Study Population. Research Report #9. October, 1970. (Exceptional Children, 1971, 38, 293-299).

11. R. Rubin. Sex Differences in Effects of Kindergarten Attendance on Development of School Readiness and Language Skills. Research Report #10. October, 1970. (Elementary School Journal - in press).

12. R. Bruininks & W. Lucker. Change and Stability in Correlations Between Intelligence and Reading Test Scores Among Disadvantaged Children. Research Report #11. October, 1970. (Journal of Reading Behavior, 1970, 2, 295-305)

13. R. Bruininks. Teaching Word Recognition to Disadvantaged Boys with Variations in Auditory and Visual Perceptual Abilities. Research Report #12. November, 1970. (Journal of Learning Disabilities, 1970, 3, 30-39)

14. R. Bruininks & C. Clark. Auditory and Visual Learning in First Grade Educable Mentally Retarded Normal Children. Research Report #13. November, 1970. (American Journal of Mental Deficiency, in press)

15. R. Bruininks & C. Clark. Auditory and Visual Learning in First-, Third-, and Fifth-Grade Children. Research Report #14. November 1970.

16. D. Moores. Education of the Deaf in the United States*, Occasional Paper #2. November, 1970. (Moscow Institute of Defectology, 1971, Published in Russian)

17. J. Rynders. Industrial Arts for Elementary Mentally Retarded Children: An Attempt to Redefine and Clarify Goals. Occasional Paper #3. January, 1971.

18. D. Feldman. Map Understanding as a Possible Crystallizer of Cognitive Structures. Occasional Paper #4. January, 1971. (American Educational Research Journal, 1971, 3, 484-502)

19. P. Broen & G. Siegel. Variations in Normal Speech Disfluencies. Research Report #15. January, 1971 (Language & Speech, in press)

20. D. Feldman, B. Marrinan, & S. Hartfeldt. Unusualness, Appropriateness, Transformation and Condensation as Criteria for Creativity". Research Report #16. February, 1971. (American Educational Research Association Annual Conference, New York, February 1971)

21. D. Moores. Neo-Oralism and the Education of the Deaf in the Soviet Union. Occasional Paper #5. February, 1971. (Exceptional Children, January, 1972)

ED 071236

Research Report #24

Project No. 332189
Grant No. OE-09-332189-4533 (032)

ELABORATION TRAINING AND VERBALIZATION AS FACTORS FACILITATING RETARDED CHILDREN'S RECALL[1]

Arthur M. Taylor
University of Minnesota

Marie Josberger
Indiana University

Susan E. Whitely
University of Minnesota

Research, Development and Demonstration
Center in Education of Handicapped Children
University of Minnesota
Minneapolis, Minnesota

December 1971

The research reported herein was performed pursuant to a grant from the Bureau of Education for the Handicapped, U. S. Office of Education, Department of Health, Education, and Welfare to the Center of Research and Development in Education of Handicapped Children, Department of Special Education, University of Minnesota. Contractors undertaking such projects under government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official position of the Bureau of Education for the Handicapped.

Department of Health, Education and Welfare
U. S. Office of Education
Bureau of Education for the Handicapped

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY

RESEARCH AND DEVELOPMENT CENTER
IN EDUCATION OF HANDICAPPED CHILDREN
Department of Special Education
Pattee Hall, University of Minnesota, Minneapolis, Minnesota 55455

The University of Minnesota Research, Development and Demonstration Center in Education of Handicapped Children has been established to concentrate on intervention strategies and materials which develop and improve language and communication skills in young handicapped children.

The long term objective of the Center is to improve the language and communication abilities of handicapped children by means of identification of linguistically and potentially linguistically handicapped children, development and evaluation of intervention strategies with young handicapped children and dissemination of findings and products of benefit to young handicapped children.

Abstract

The effects of two types of elaboration training on the paired-associate learning of educable retarded children were compared over two levels of verbalization, none and overt. 32 subjects were randomly assigned to one of four elaboration treatment conditions. The individual testing procedures were such that each subject was first tested on a warm-up list, then trained to generate elaborations, and finally given two trials to learn a list of 18 noun-pairs. The results supported the major hypothesis that overt verbalization would facilitate recall under both types of elaboration training, but no support was found for the secondary hypothesis that verbalization would result in relatively greater facilitation with one type of elaboration, imagery, than with the other type, sentence elaboration. Several possible explanations of the general effectiveness of overtly verbalized elaborations were examined. In addition, educational applications of elaboration were discussed, with special attention given to the implications of the verbalization finding.

Elaboration Training and Verbalization as Factors Facilitating Retarded Children's Recall

It has consistently been demonstrated that normal learners, both children and adults, recall more paired-associates when the words to be remembered are learned in a meaningful elaborative context (Reese, 1970; Rohwer, 1970, 1971). However, the elaboration effect is not as clear with educable mentally retarded (EMR) children. EMR children can utilize elaborative contexts when they are provided by the experimenter (Milgram, 1968; Turnure, 1971), but the ability of these learners to generate their own elaborative contexts when instructed to do so has been questioned (Jensen & Rohwer, 1963; MacMillan, 1970). MacMillan found instructions to generate elaborative contexts in the form of sentences of limited effectiveness with EMR children, whereas several studies (Milgram, 1967, 1968; Taylor, Josberger, & Knowlton, 1972) have found that such elaboration instructions facilitated the learning of retarded children.

A recent trend in elaboration research with normal children is to identify the conditions under which the elaboration effect is limited (cf. Levin, Horvitz, & Kaplan, 1971). For example, Levin et al. have noted that the magnitude of the elaboration effect is related to several procedural variables: the kind of mediational strategy incorporated, the method of testing adopted, the type of learning materials employed (verbal versus pictures), and the mode

of verbal input (reading versus listening). It seems that procedural variables might also explain the inconsistent findings when EMR children are instructed (trained) to elaborate. At the most general level, the effectiveness of elaboration training procedures is determined by the degree to which the learner actively produces and/or processes his elaborations (cf. Anderson, Goldberg, & Hidde, 1971; Levin et al., 1971; Turnure, 1971). However, a more tangible procedural variable was present in all the previous studies which have demonstrated that instructions to elaborate facilitates recall by EMR children (Milgram, 1967, 1968; Taylor, et al., 1972). The procedures employed in these studies resulted in all the EMR subjects overtly verbalizing their elaborations. Thus, the facilitating effects attributed to elaboration instructions were confounded with the overt verbalization of the elaborations in all of these studies. The major purpose of the present study was to independently measure the effects of elaboration instructions and overt verbalization.

Two types of elaboration instructions have been investigated intensively, one attempts to insure that the elaborations are coded in the form of integrated mental images and the second that elaborations are coded verbally as phrases, sentences, and paragraphs. Studies comparing these two types of elaboration with adult subjects (Bower & Winzenz, 1970; Paivio & Foth, 1970) have generally supported the hypothesis that imagery facilitates recall more than verbal elaboration. However, previous studies with both normal (Montague, 1970; Taylor, 1970) and retarded children (Taylor, et al., 1972) have found no significant differences between the effectiveness of the two

types of elaboration.

It seems that the inconsistent findings with adults and children may be the result of differential activities undertaken by these two populations when they are asked to generate images. For example, several researchers (Bower & Winzenz, 1970; Paivio, 1969; Rohwer, 1970) have suggested that adults generate both an image and a complementary verbal elaboration, while it seems that young children do not spontaneously construct verbal elaborations describing their images (Rohwer, 1970). However, it seems that this spontaneous production deficiency could be corrected by requiring children given imagery training to overtly verbalize their elaborations. Thus, a second purpose of the study was to determine if overt verbalization produces relatively more facilitation for imagery elaboration than it does for sentence (verbal) elaboration.

METHOD

Subjects

The subjects were 32 children selected from three public school classes for educable mentally retarded children. The children ranged in CA from 9 to 13 years with a range in IQ from 55 to 75. The mean Lorge-Thorndike IQ for the sample was 68.7.

The subjects were randomly assigned to one of four conditions of a 2 x 2 factorial design, which resulted from the crossing of two types of elaboration instructions (imagery and sentence generation) with two levels of verbalization (overt and none). Each subject was tested by one of two experimenters, such that each experimenter tested

four subjects in each of the four conditions. The mean Lorge-Thorndike IQ scores for the four instructional treatment conditions were as follows: imagery with overt verbalization, 68.3; imagery without verbalization, 69.0; sentences with overt verbalization, 67.6; sentences without verbalization, 69.8.

Two a priori criteria from a previous study (Taylor et al., 1972) were established for the elimination of subjects from the sample: 1) any severe communication problem and 2) failure to attempt to follow the instructional sets. Although no subjects were eliminated for these reasons one subject was found to be heavily sedated for control of epilepsy and was replaced.

Materials

The 52 nouns for this study were selected on the basis of the following criteria: presence in the reading vocabularies of retarded children, ease with which sentences could be generated using each pair of nouns, and high picturability or concreteness of the referent of each noun. All words met the stated criteria in pilot tests conducted with younger retarded children (CA = 8 to 10).

Subsequently the 52 nouns were distributed into 2 lists containing 8 and 18 noun pairs respectively. The nouns were paired such that there were no obvious direct associations between them (e.g., Airplane-Clown, Horse-Hat, Radio-Dog, Shoe-Cake).

Twelve additional nouns drawn from the same source were used as examples throughout the training sessions. The only additional materials used were two line drawings in black ink on white 5 x 8 cards. The drawings were used as examples in conjunction with the

instructions in the training of imagery subjects. No visual aids accompanied the training of the sentence generation subjects, for which oral examples were used.

Procedure

Each child was tested individually on two paired-associate lists, with all subjects given the same instructions for learning List 1 (warm-up list). List 1 consisted of eight pairs of nouns which were presented orally at a 15 second rate. The subject was asked to repeat each pair of words aloud immediately after hearing the experimenters presentation. He was also told that he should remember the words together. List 1 was preceded by three practice pairs to insure that the subject understood the PA task and that he could recall the response nouns. The recall stimuli were presented orally at a 10 second rate. Immediately after this testing and prior to the presentation of List 2, each subject was administered one of the instructional training procedures.[2]

The instructional treatments followed the same general pattern for all four conditions. The subjects were instructed to repeat each pair aloud, and then to use a "special way" to remember the words. The special way required the child to elaborate on each pair in such a way as to establish an interaction or relationship between the two words. The elaboration was in the form of mental images of the two things doing something together for half the subjects, and in the form of simple stories or sentences about the two things doing something together for the other half. Attempts were made to make the imagery and sentence generation instructions equivalent on

such variables as the action implied in the relationships, reinforcement, length of instructions, practice, and feedback from the experimenter.

The elaboration training procedures involved the presentation of four practice pairs with a lesser amount of instructional aid and experimenter feedback accompanying each successive pair. Thus, the experimenter supplied the elaboration for the child on the first pair, the experimenter supplied less while the subject generated more of the elaboration for the pair, and so on. Administration of the instructional treatment was fairly detailed and took approximately 10 minutes per child.

For the first two practice pairs the subjects assigned to overt- and no-verbalization conditions were treated identically, with each subject encouraged to verbalize his elaboration so that the experimenter could monitor ard shape the child's elaborations. However, beginning with the third practice pair subjects in the no-verbalization conditions were instructed to keep their elaborations a secret, while those in the overt conditions were instructed to continue verbalizing their elaborations. Thus, both the elaboration and verbalization factors were manipulated through instructions, with the four instructional procedures developed so as to vary only in the manner specified. However, throughout the testing prompts were used to insure that the children verbalized (or not) as instructed.

The 18 pair list was presented at a 15 second rate. This rate was selected because pilot testing revealed that 15 seconds was sufficient time for comparable subjects to generate and verbalize

their elaborations. None of the 32 subjects seemed to have any problems completing their elaboration tasks in this time period. Immediately after all 18 pairs had been presented, the subject was given brief instructions and was presented with the 18 stimulus nouns at a 10 second rate. Following the test on trial 1 the subject was reminded of his elaboration and verbalization instructions, and he was then presented with the same 18 pairs in a different random order. After the presentation phase of trial 2 and a reminder as to the testing procedures, the stimulus words were again presented for testing but in another random order. The testing on trial 2 was followed by a questioning period to determine if the child followed the instructed elaboration strategy.

Results

An analysis was conducted on the data for the eight pair warm-up list in order to determine if the subjects randomly assigned to the four treatment conditions were initially equivalent in the level of paired-associate recall. These results were analyzed by a Conditions (4) x Experimenter (2) fully crossed analysis of variance. This analysis revealed no significant differences between the means of the four conditions, $F < 1$. The experimenter main effect and the Conditions x Experimenters interaction also yielded no significant differences.

The effects of the instructional treatments on the number of nouns recalled from the 18-pair List 2 were examined by an Elaboration (2) x Verbalization (2) x Trials (2) analysis of variance. This analysis

indicated no significant differences between subjects given imagery instructions and subjects given sentence generation instructions. Also, no support was found for the hypothesis that overt verbalization will differentially facilitate imagery and verbal elaboration, since the Elaboration x Verbalization interaction was not significant ($F < 1$).

Inspection of the means presented on Table 1 reveals that the largest treatment effect involved the main effect for verbalization, which was found to be significant, F (1, 28) = 12.80, $p < .01$. Thus, as hypothesized, overt verbalization had a general facilitory effect upon both subjects instructed to use imagery and those instructed to use sentence elaboration. In addition, the main effect for trials was highly significant, F (1, 28) = 72.34, $p < .01$, while none of the interactions involving trials obtained significance.

The mean number correct was converted into percentages (mean recall/total possible) in order to better compare the differences across lists. These percentages for each condition on List 1 and each of the two trials from List 2 are presented in Table 2. Although a direct test of the recall from the two lists was not made because of the varying list lengths, comparison of the percent recalled on List 1 with that on Trial 1 of List 2 gives some indication of this difference. The 37% average recall of the conditions without verbalization does not seem to greatly exceed the 24% average recall on the warm-up list, whereas the 60% average recall for the conditions overtly verbalizing their elaborations apparently represents a substantial

increase. Table 2 additionally reveals that the average recall increase for List 2 was greater than 20% from Trial 1 to Trial 2. Further inspection of this increase (see Table 2) suggests that it is fairly constant across elaboration instructions.

Discussion

The major finding of this study was the significant increment overt verbalization added to the effects produced by elaboration instructions. This finding is particularly interesting in light of the generalizations developed in other studies of retardates ability to generate elaborations (MacMillan, 1970; Milgram, 1967, 1968; Taylor, et al., 1972). In a previous study using similar subjects, materials, and elaboration instructions, Taylor et al. (1972) concluded that their results clearly demonstrated the facilitation produced by elaboration instructions with educable retarded children, although they noted that the effects of elaboration and verbalization were confounded in their study. It seems clear from the results of the present study that this conclusion should have been limited to conditions where elaboration and verbalization are confounded. More generally, it seems that overt verbalization may be an important factor in, and possibly a necessary condition for, the facilitating effects found with elaboration instructions (e.g., Milgram, 1967, 1968). In addition, it seems that the failure to verbalize may have been related to the relative ineffectiveness of the elaboration instructions in the MacMillan (1970) study. Thus, as in recent studies with normal children, the

effectiveness of elaboration with retarded children seems to be dependent on certain task specific procedural variables (cf. Levin, et al., 1971).

At the most general level, the failure of elaboration instructions without verbalization to facilitate recall as expected seems to be due to a "production deficiency" of these retarded children. A production deficiency is said to occur when the learner has the ability to effectively use mediating responses when they are provided but is unable to generate such responses (cf., Flavell, 1970). Other researchers have invoked the concept of production deficiency to explain the poor performance of retarded children on similar mediation and elaboration tasks. For example, the data from previous studies (Martin, 1967; Milgram, 1967, 1968) clearly demonstrate that retarded children do not spontaneously generate effective mediators when left to their own devices, and thus they are said to suffer from a spontaneous production deficiency. MacMillan (1970) has further suggested that educable retarded children exhibit a production deficiency even when instructed to generate sentence elaborations. In a study directly related to verbalization, Ross (1971) has inferred a production deficiency from the failure of many of the retarded children in her study to verbalize their mediators.

Unfortunately postulating a production deficiency for the subjects not permitted to verbalize in the present study fails to explain how verbalizing elaborations resulted in increased production. Three alternative, and probably interrelated, explanations are offered for this increased production. First, it seems likely that overt

verbalization increases the probability that elaborations are produced. It was possible to record the number of times the subjects in the overt verbalization condition produced any elaboration for a pair, with elaborations reported for over 90% of the pairs. Although it was impossible to directly measure the quantity of verbalizations produced by subjects not permitted to verbalize their elaborations, analysis of post-experimental inquiries suggests a lower percentage of elaborations produced. However, more refined methods of obtaining production data are necessary to test this hypothesis.

A second explanation suggests that overt verbalization results in a better quality of elaboration. Although previous analyses (Milgram, 1968; Reese, 1970) have suggested that quality of the elaboration is unrelated to its probability of facilitating recall, it seems that some lower limit of quality, such as the actor-action-object sentence structure (Bower & Winzenz, 1970), must be neceessary for effective utilization of the elaborations produced. A more complete development of this second explanation seems to have a high degree of overlap with the final explanation offered here, that overt verbalization results in different activities on the part of the learner.

The final explanation is based on the contention that efficient learning and memory require active processing of information (cf., Bobrow & Bower, 1969; Levin, et al., 1971; Anderson, et al., 1971). Thus, it is proposed that overt verbalization of elaborations facilitated memory in the present study because it resulted in more (or at

least different types of) processing activities in these EMR children. In this regard, it seems quite possible that overt verbalization of the elaborations focused the learner's attention on the critical features and demands of the task. For example, these children may have developed a better understanding of these task features and demands (cf. Jenkins, 1972; Miller, Galanter & Pribram, 1960); they may also have focused their attention on the relations and interactions critical to elaboration (cf. Bower & Winzenz, 1970; Rohwer, 1970); and in addition, it seems likely that they were forced to better utilize the 15 seconds they were given to learn each pair since they were required to communicate their elaborations. That the critical factor resulting from overt verbalization is attention has been suggested by Wozniak (1971, personal communication), who has found preliminary evidence that overt verbalization has a positive effect on the perceptual and physiological indices used to infer attention from the subjects orienting responses. Thus, a viable explanation seems to be that overt verbalization of the elaborations eliminated the production deficiency found with these EMR children by better focusing the child's attention on the task.

The secondary hypothesis, that overt verbalization would have a relatively greater effect with imagery elaboration, was totally unsupported by the data. Three alternatives are offered to explain the failure to find the imagery with verbalization condition superior to the sentence elaboration with verbalization condition. The first alternative assumes that the imagery with verbalization conditions provided a dual memory code (imagery + verbal codes), but it seems

that the availability of both codes may not be the necessary condition for imagery elaboration to be superior (cf. Taylor & Whitely, 1971; Bower, 1970) A second alternative suggests that imagery and verbal elaboration are not differentially effective with children since the present study, as well as previous research with children (Montague, 1970; Taylor, 1970; Taylor, et al., 1972) found no significant differences between instructional treatments to elaborate in these ways. Only one study (Taylor & Whitely, 1971) has thus far found imagery to be superior, and this study utilized a modified paired-associate task which permitted greater spatial organization.

The final alternative offered to explain failure to support the secondary hypothesis is that the instructions and training procedures failed to produce differential elaborative activities in the subjects. That is, the imagery and sentence elaboration conditions may have differed only on paper. However, in a study using comparable subjects and training procedures, Taylor, et al. (1972) reported that the imagery subjects tended to describe their elaborations in the present tense, whereas the sentence elaboration subjects significantly utilized the past tense. This finding and related observations during post-experimental inquiry support the assumption that the two types of elaboration training did produce differential activities in the subjects. The effectiveness of the imagery training procedures is further verified by the fact that both the present study and the previous Taylor et al. study utilized auditory (and not pictorial) input. This is particularly interesting since Levin,

et al. (1971) found that older, normal children produced effective interacting images only when they were presented with pictorial stimuli. The critical difference in instructions seems to be that the EMR in the present study were first trained to form their own individual representations of aurally presented words before forming an integrated image.

Rohwer (cf. 1971) has made a strong case for the educational importance of elaboration, in which he suggests that it is a prerequisite skill for many in-class and extra-class tasks children must perform. For example, children must learn to utilize contextual cues and generate elaborative relations for success in reading and problem solving. Furthermore, it seems that elaboration (Ross uses the term mediation) training may be retained and transferred from task to task by EMR children (Ross, 1971). A recent study (Bender, Taylor, Riegel, & Turnure, 1972) failed to demonstrate similar transfer with EMR children from laboratory elaboration training to a classroom social studies lesson, but Bender, et al. suggests that this failure was probably due to the large component of elaboration training built into the classroom lesson, which resulted in "ceiling effects." The Bender et al. study is also educationally relevant because it demonstrated that imagery elaboration could be trained and effectively utilized for either highlighting specific stimuli or integrating several things via relational images. On a much larger scale, a group of researchers interested in elaboration were put in charge of a six-week summer instructional program. The emphasis in the summer program was to evaluate the usefulness of

elaboration for teaching reading and math skills (Riegel & Taylor, 1971). One of the major outgrowths of this summer program is an attempt to construct a vocabulary curriculum based on elaboration (see also Ammon & Ammon, 1971). The preliminary development and evaluation of this vocabulary curriculum are now being conducted, and it is hoped that this evaluation will permit separate analysis of the potential of elaboration and other organizational strategies for supplying young EMR children with a functional vocabulary.

The unique educational applications to be derived from the present study are in regard to the effects of overt verbalization on elaboration training. If overt verbalization is also necessary to produce the large facilitating effects expected with elaboration in the classroom, then the influence of this verbalization on classroom teaching must be considered. The current training procedures are ideal for one-to-one tutoring, but overt verbalization of elaborations may be disruptive in group teaching. To bypass this problem children could be trained to covertly verbalize their elaborations or to communicate through some other means (e.g., drawing). The potential of these techniques are currently under investigation, but in the meantime classroom activities could be adapted to overt verbalization by training the children to monitor and process each other elaborations.

References

Ammon, P. R. & Ammon, M. S. Effects of training black preschool children in vocabulary versus sentence construction. Journal of Educational Psychology, 1971, 62, 421-426.

Anderson, R. C., Goldberg, S. R. & Hidde, J. L. Meaningful processing of sentences. Journal of Educational Psychology, 1971, 62, 395-399.

Bender, N. N., Taylor, A. M., Riegel, R. H., & Turnure, J. E. Variations of strategy pre-training for a strategy based approach for teaching EMR children the United States. Paper to be presented at the annual meeting of the American Educational Research Association, April, 1972, Chicago.

Bobrow, S. A. & Bower, G. H. Comprehension and recall of sentences. Journal of Experimental Psychology, 1969, 80, 455-461.

Bower, G. H. Mental imagery and associative learning. In L. Gregg (Ed.), Cognition in learning and memory. New York: Wiley, 1970.

Bower, G. H. & Winzenz, D. Comparison of associative learning strategies. Psychonomic Science, 1970, 20, 119-120.

Flavell, J. H. Developmental studies of mediated memory. In Lipsitt, L. and Reese, H. W. (Eds.), Advances in child development and behavior, Vol. 5. New York: Academic Press, 1970.

Jenkins, J. J. What's left to say: Discussion of "What is memory development the development of?" Human Development, 1972, in press.

Jensen, A. R. & Rohwer, W. D. Jr. The effect of verbal mediation on the learning and retention of paired-associates by retarded adults. American Journal of Mental Deficiency, 1963, 68, 80-84.

Levin, J. R., Horvitz, J. M., & Kaplan, S. A. Verbal facilitation of paired-associate learning: A limited generalization? Journal of Educational Psychology, 1971, 62, 439-444.

MacMillan, D. L. Facilitative effect of verbal mediation on paired-associate learning by EMR children. American Journal of Mental Deficiency, 1970, 74, 611-615.

Martin, C. J. Associative learning strategies employed by deaf, blind, normal, and retarded children. Educational Research Series, 1967, 38, 1-158.

Milgram, N. A. Retention of mediation set in paired-associate learning of normal children and retardates. Journal of Experimental Child Psychology, 1967, 5, 341-349.

Milgram, N. A. The effects of MA and IQ on verbal mediation in paired associate learning. The Journal of Genetic Psychology, 1968, 113, 129-143.

Miller, G. A., Galanter, E. H. &. Pribram, K. H. Plans and the structure of behavior. New York: Holt, Rinehart & Winston, 1960.

Montague, R. B. The effect of mediational instructions on associative skills of first grade intercity children. Paper presented at the annual meeting of the American Educational Research Association, Minneapolis, March, 1970.

Paivio, A. Mental imagery in associative learning and memory. Psychological Review, 1969, 76, 241-263.

Paivio, A. & Foth, D. Imaginal and verbal mediators and noun-concreteness in paired-associate learning: The elusive interaction. Journal of Verbal Learning and Verbal Behavior. 1970, 9, 84-390.

Reese, H. W. Imagery and contextual meaning. Psychological Bulletin, 1970, 73, 404-414.

Riegel, R. H. & Taylor, A. M. Teaching basic academic skills to handicapped, disadvantaged pupils through use of cognitive learning strategies. Report of Title I Summer Instructional Program, St. Paul, August 1971.

Rohwer, W. D., Jr. Images and pictures in children's learning: Research results and educational implications. Psychological Bulletin, 1970, 73, 393-403.

Rohwer, W. D., Jr. Prime time for education: Early childhood or adolescence? Harvard Educational Review, 1971, 41, 319-341.

Ross, D. Retention and transfer of mediation set in paired-associate learning of educable retarded children. Journal of Educational Psychology, 1971, 62, 322-327.

Taylor, A. M. Visual imagery instruction and action versus non-action situations relative to recall by children. Final report of U. S. Office of Education grant #OEG-5-9-245030-0023, May 1970.

Taylor, A. M., Josberger, M. C. and Knowlton, J. K. Mental elaboration and learning with retarded children. American Journal of Mental Deficiency, 1972, in press.

Taylor, A. M. & Whitely, S. E. Imagery as a relational organizer in associative learning: Spatial and semantic relations. Paper presented at the biennial meeting of the Society for Research in Child Development, Minneapolis, May 1971.

Turnure, J. E. Types of verbal elaboration in the paired-associate performance of mental retardates. American Journal of Mental Deficiency, 1971, in press.

Footnotes

[1]Collection of the data was supported by a grant from the Bureau of Education for the Handicapped, U.S. Office of Education to the Research and Development Center in Education of Handicapped Children at Indiana University (#OEG-9-242178-4149-032). The preparation of the manuscript was supported by a grant (#OE-09-332189-4533-032) to the Research, Development and Demonstration Center in Education of Handicapped Children at the University of Minnesota from the Bureau of Education for the Handicapped. The authors gratefully acknowledge the assistance of Miss Patricia Calvert who helped in the collection and analysis of the data. Thanks also to Dr. James E. Turnure, Dr. Donald F. Moores, Dr. Robert Wozniak, and Mrs. Martha L. Thurlow who critically read earlier drafts of this paper.

[2]The lists of noun pairs used in the study, as well as complete descriptions of the instructional treatments are found in the appendix to this paper.

TABLE 1

Mean Number of Words Recalled Across Trials on List 2 as a Function of Treatment Condition

	Elaboration		
Verbalization	Imagery	Sentences	
Overt	12.81	12.94	12.88
None	9.25	7.88	8.56
	11.03	10.41	

TABLE 2

Mean Percentage Recall by Treatment Conditions for Both Lists

	Elaboration and Verbalization				
	Imagery		Sentences		
Lists (Trials)	Overt	None	Overt	None	
List 1	16	28	25	25	23.5
List 2					
Trial 1	57	40	62	34	48.25
Trial 2	85	63	82	54	71.0
	71	51.5	72	44	

Lists Appendix: List of Noun Pairs

LIST I (warm-up list)	LIST II (Elaboration)
Cat - Log	Man - Fork
Pencil - Potato	Devil - Truck
Girl - Umbrella	Clock - Frog
Blanket - Table	Pie - Bird
Car - House	Needle - Sock
Elephant - Strawberry	Airplane - Clown
Rope - Dress	Knife - Box
Hammer - Bell	Shoe - Cake
	Horse - Hat
	Baby - Bicycle
	Fire - Chair
	Doll - Book
	Toothbrush - Letter
	Radio - Dog
	Piano - Zipper
	Scissors - Donut
	Button - Lock
	Broom - Monkey

Instructions Appendix: List I

Hi, (John), I want you to play a kind of game with me. The name of the game is "Remember the Words." I am going to tell you two words and then I want you to say the two words. Do you think you can do that? Good. The two words are FLAG & SPOON. Now you say the words (John). That was good (John). Now I want you to remember those two words so that later when I say the first word- FLAG you should say the word that goes with it. What is the word that goes with FLAG? (spoon) Good!

Here are two more words: TEACHER & LAMP. You say the words now. Good (John). Everytime I say TEACHER, I want you to say the word that goes with it. What is the word that goes with TEACHER? (Lamp) Good (John).

Let's try two more words: APPLE & BOAT. Say those two words (John). Good. Now every time I say APPLE you should say the word that goes with it. Can you remember the word that goes with APPLE? (boat). That's good (John).

Now let's play the game. When I say a word--tell me the word that goes with it.

What is the word that goes with FLAG?	(spoon)	Good.
What is the word that goes with TEACHER?	(lamp)	Good.
What is the word that goes with APPLE?	(boat)	Good. (John).

Let's play the same game with some more words. I want you to say the words after I say them, and think about them until I tell you the next two words.

(Present List at 15 sec/pair)

Now, (John) I am going to tell you the first word and I want you to tell me the word that goes with it.

(Test List I @ 10 sec/pair)

Instructions Appendix: Sentence Elaboration with Overt Verbalization

You played that game so well that I want to play another game with you. This time I want you to use a special way to remember the words. The special way is for you to make up a sentence about the two things I name for you. I want you to use the two words in a sentence. Will you try to do that? Good!

Two words that I want you to make up a sentence about are: BOY & CUP. Say the two words. A sentence that I made up is: "A boy is kicking the cup." That is how I want you to remember the words, by making up a sentence about the two things doing something together. Now, you make up a sentence about the two things. (Get feedback, make sure S provides relationship. If not, then "Can you make up a sentence with them doing something together?") Good! Any time I say "BOY", I want you to think of the sentence you made up and tell me the other word in the sentence. What is in the sentence with "BOY"? (CUP) Good!

Here are two more wrods: WAGON & EGG. Say the two words. That's right. Now make up a sentence about a wagon and an egg doing something together. (Pause) Tell me about the sentence! (If related) Good! (If not, then - "Make up a sentence with the WAGON & EGG doing something together! Like, the WAGON is running over the EGG). Whenever I say WAGON I want you to think if the sentence you made up and tell me what was in the sentence with the WAGON.)

Now I want you to try two more words: FISH & GLOVE. Say the words. Now make up a sentence about these two things doing something together. Tell me about the sentence! (get feedback, but give none) Good! Now think about the sentence until I say the next two words.

Here are two more words: TELEPHONE & KING. Say the words aloud and then make up a sentence about the two things doing something together. (Pause) Tell me about the sentence! Good!

Now, when I say a word--you think of the sentence you made up and tell me the other thing in the sentence.

BOY	What was in the sentence with BOY	(CUP)
WAGON		(EGG)
FISH		(GLOVE)
TELEPHONE		(KING)

Additional pairs to be used only if necessary

RIVER	MAILBOX
WINDOW	MOP
TENT	SPIDER

That was good (John). Now let's play the game with some more words. Say the words and then think of a sentence about the two things doing something together. After you make up a sentence I want you to tell me about it. Then I want you to think about the sentence until I say the next two words.

(Present List 2 - Trial 1 at 15 sec/pair)

Now let's see how well you can remember. When I say a word, think of the sentence you made up and tell me the other thing in the sentence.

(Test List 2 - Trial 2 at 10 sec/pair)

Now (John), I want you to play the game again with the same words. Say the words aloud then make up a sentence. After you have a sentence, tell me about it. Then think of the sentence until I say the next two words. You can think of the same sentence that you made up before or you can think of a new sentence.

(Present List 2 - Trial 2 at 15 sec/pair)

Now, let's see how well you can remember. When I say a word, think of the sentence you made up and tell me the other thing in the sentence. (Test List at 10 sec/pair)

(Remind S not to tell anyone about the words, procedure, etc.)

Instructions Appendix: Sentence Elaboration without Verbalization

You played that game so well that I want to play another game with you. This time I want you to use a special way to remember the words. The special way is for you to make up a sentence about the two things I name for you. I want you to use the two words in a sentence. Will you try to do that? Good!

Two words that I want you to make up a sentence about are: BOY & CUP. Say the two words. A sentence that I made up is: "A boy is kicking the cup." That is how I want you to remember the words, by making up a sentence about the two things doing something together. Now you make up a sentence about the two things. (Get feedback. Make sure S provides relationship. If not, then, "Can you make up a sentence with them doing something together?" Good! Any time I say "BOY," I want you to think of the sentence you made and tell me the other word in the sentence. What is the sentence with "BOY?" (CUP) Good!

Here are two more words: WAGON & EGG. Say the two words. That's right. Now make up a sentence about a WAGON and an EGG doing something together. (Pause) Tell me about the sentence! (If related) Good! If not: "make up a sentence about these two things doing something together, but this time I don't want you to tell me about the sentence. I want you to keep it a secret. (Pause) Did you make up a sentence? Good! Now think about the sentence until I say the next two words.

Now I want you to try two more words: FISH & GLOVE. Say the words. Now make up a sentence about these two things doing something together, but this time I don't want you to tell me about the sentence. I want you to keep it a secret. (Pause) Did you make up a sentence? Good! Now think about the sentence until I say the next two words.

Here are two more words: TELEPHONE & KING. Say the words aloud and then make up a sentence about the two things doing something together but be sure and keep the sentence a secret. (Pause) Did you make up a sentence? Good!

Now, when I say a word--you think of the sentence you made up and tell me the other thing in the sentence.

BOY	What was in the sentence with the boy?	(CUP)
WAGON		(EGG)
FISH		(GLOVE)
TELEPHONE		(KING)

Additional pairs to be used only if necessary

RIVER	MAILBOX
WINDOW	MOP
TENT	SPIDER

That was good (John). Now let's play the game with some more words. Say the words and then think of a secret sentence about the two things doing something together. Be sure to keep the sentences a secret and think about the sentences until I say the next two words.

(Present List 2 - Trial 1 at 15 sec/pair)

Now let's see how well you can remember. When I say a word, think of the sentence you made up and tell me the other thing in the sentence.

(Test List 2 at 10 sec/pair)

(Trial 2)

Now (John), I want you to play the game again with the same words. Say the words aloud then make up a secret sentence and think about the sentence until I say the next two words. You can think of the same sentence that you made up before or you can think of a new sentence.

(Present List 2 - Trial 2 at 15 sec/pair)

Now, let's see how well you can remember. When I say a word, think of the sentence you made up and tell me the other thing in the sentence.

(Test List 2 at 10 sec/pair)

Remind S not to tell anyone about words, procedure, etc.

Instructions Appendix: Imagery Elaboration with Overt Verbalization

You played that game so well that I want to play another game with you. This time I want you to use a special way to remember the words. The special way is for you to make up a picture in your mind about the two things I name for you. I want you to picture the two things doing something together. Will you try to do that? Good!

Two words that I want you to make up a picture about are: BOY & CUP. Say the two words. Here is a picture that I made up. (Show integrated picture) What is happening in the picture? (Be sure to elicit the relation, i.e., BOY kicking CUP.) That is how I want you to remember the words, by making up a picture of them doing something together. Now, you make up a picture in your mind about the two things. (get feedback - make sure S provides relationship. If S does not provide the relationship, "Can you make up a picture where they are doing something together?") Good! Anytime I say "BOY," I want you to think of the picture you made up and tell me the other thing in the picture. What was in the picture with "BOY?" (CUP) Good!

Here are two more words: (Show unintegrated picture) WAGON and EGG. Say the two words. That's right. Now make up a picture in your mind about a WAGON and EGG doing something together. (Pause) Tell me about the picture. (If there is a relationship. Good! But if no relationship--then, "Can you make up a picture where the WAGON and EGG are doing something together?" Like--The WAGON running over the EGG.) Whenever I say WAGON I want you to think of the picture you made up and then tell me what was in the picture with the WAGON.

Now I want you to try two more words: FISH & GLOVE. Say the words. Now make up a picture about these two things doing something together. (Pause) Tell me about the picture! (Get feedback, but give none) - Good! Now think about the picture until I say the next two words.

Here are two more words: TELEPHONE & KING. Say the words aloud and then make up one picture about the two things doing something together. (Pause) Tell me about the picture! Good!

Now, when I say a word - you think of the picture you made up and tell me the other thing in the picture.

BOY	What was in the picture with the BOY?	(CUP)
WAGON		(EGG)
FISH		(GLOVE)
TELEPHONE		(KING)

Additional pairs to be used only if necessary

RIVER	MAILBOX
WINDOW	MOP
TENT	SPIDER

That was good (John). Now let's play the game with some more words. Say the words and then think of a picture about the two things doing something together. After you make up a picture I want you to tell me about it. Then I want you to think about the picture until I say the next two words.

(Present List 2 - Trial I at 15 sec/pair)

Now, let's see how well you can remember. When I say a word, think of the picture you made up and tell me the other thing in the picture.

(Test List 2 at 10 sec/pair)

(Trial 2)

Now, (John), I want you to play the game again with the same words. Say the words aloud then make up a picture. After you have a picture - tell me about it then think of the picture until I say the next two words. You can think of the picture that you made up before or you can think of a new picture.

(Present List 2 - Trial 2 at 15 sec/pair)

Now, let's see how well you can remember. When I say a word, think of the picture you made up and tell me the other thing in the picture.

(Test List 2 at 10 sec/pair)

(Remind S not to tell anyone about words, procedure, etc.)

Instructions Appendix: Imagery Elaboration without Verbalization

You played that game so well that I want to play another game with you. This time I want you to use a special way to remember the words. The special way is for you to make up a picture in your mind about the two things I name for you. I want you to picture the two things doing something together. Will you try to do that? Good!

Two words that I want you to make up a picture about are: BOY & CUP. Say the two words. Here is a picture that I made up. (Show integrated picture) What is happening in the picture? (Be sure to elicit the relation, i.e., BOY kicking CUP.) That is how I want you to remember the words, by making up a picture of them doing something together. Now, you make up a picture in your mind about the two things. (Get feedback--make sure S provides relationship. If S does not provide the relationship, "Can you make up a picture where they are doing something together?") Good! Anytime I say "BOY", I want you to think of the picture you made up and tell me the other thing in the picture. What was in the picture with "BOY"? (CUP) Good!

Here are two more words: (Show unintegrated picture) WAGON & EGG. Say the two words. That's right. Now make up a picture in your mind about a WAGON and an EGG doing something together. (Pause) Tell me about the picture! (If there is a relationship) Good! (But if no relationship--then "Can you make up a picture where the WAGON and EGG are doing something together?" Like--The WAGON is running over the EGG.") Whenever I say "WAGON", I want you to think of the picture you made up and then tell me what was in the picture with the WAGON.

Now I want you to try two more words: FISH & GLOVE. Say the words. Now make up a picture about these two things doing something together, but this time I don't want you to tell me about the picture. I want you to keep it a secret. (Pause) Did you make up a picture? Good! Now think about the picture until I say the next two words.

Here are two more words: TELEPHONE & KING. Say the words aloud and then make up one picture about the two things doing something together, but be sure and keep the picture a secret. (Pause) Did you make up a picture? Good!

Now, when I say a word--you think of the picture you made up and tell me the other thing in the picture.

BOY	What	was	in	the	picture	with	the	Boy?	(CUP)
WAGON	"	"	"	"	"	"	"	Wagon?	(EGG)
FISH	"	"	"	"	"	"	"	Fish?	(GLOVE)
TELEPHONE	"	"	"	"	"	"	"	Telephone?	(KING)

Additional pairs to be used only if necessary

RIVER	MAILBOX
WINDOW	MOP
TENT	SPIDER

That was good (John). Now let's play the game with some more words. Say the words and then think of a secret picture about the two things doing something together. Be sure to keep the pictures a secret. Think about the picture you make up until I say the next two words.

(Present List 2 - Trial 1 at 15 sec/pair).

Now let's see how well you can remember. When I say a word, think of the picture you made up and tell me the other thing in the picture.

(Test List 2 at 10 sec/pair).

(Trial 2)

Now (John), I want you to play the game again with the same words. Say the words aloud then make up a secret picture and think about the picture until I say the next two words. You can think of the same picture that you made up before or you can think of a new picture.

(Present List 2 - Trial 2 at 15 sec/pair).

Now, let's see how well you can remember. When I say a word, think of the picture you made up and tell me the other thing in the picture.

(Test List 2 at 10 sec/pair)

(Remind S not to tell anyone about words, procedure, etc.)

TECHNICAL REPORTS

University of Minnesota Research, Development, and Demonstration Center in Education of Handicapped Children

(Place of publication shown in parentheses where applicable.)

1. D. Feldman. The Fixed-Sequence Hypothesis: Individual Differences in the Development of School Related Spatial Reasoning. Research Report #1, March, 1970.

2. D. Feldman and W. Markwalder. Systematic Scoring of Ranked Distractors for the Assessment of Piagetian Reasoning Levels. Research Report #2, March, 1970. (Educational and Psychological Measurement, 1971, 31, 347-362)

3. D. Moores. Evaluation of Preschool Programs: An Interaction Analysis Model. Occasional Paper #1. April, 1970. (Keynote Address, Diagnostic Pedagogy, International Congress on Deafness. Stockholm, Aug. 1970, also presented at American Instructors of the Deaf Annual Convention, St. Augustine, Florida, April, 1970).

4. J. Turnure. Reactions to Physical and Social Distractors by Moderately Retarded Institutionalized Children. Research Report #3. June, 1970. Journal of Special Education, 1970, 4, 283-294.

5. J. Turnure, J. Rynders, & N. Jones. Effectiveness of Manual Guidance, Modeling & Trial & Error Learning for Inducting Instrumental Behavior in Institutionalized Retardates. Research Report #4. June, 1970.

6. J. Turnure & M. Walsh. The Effects of Varied Levels of Verbal Mediation on the Learning & Reversal of Paired-Associates by Educable Mentally Retarded Children. Research Report #5. June, 1970. (Study I: American Journal of Mental Deficiency, 1971,76,60-67. Study II: American Journal of Mental Deficiency, 1971 in press)

7. R. Martin & L. Berndt. The Effects of Time-Out on Stuttering in a 12-year-old Boy, Research Report #6. July, 1970. (Exceptional Children, 1970, 37, 303-304).

8. J. Turnure, M. Thurlow, & S. Larsen. Syntactic Elaboration in the Learning & Reversal of Paired-Associates by Young Children. Research Report #7, January, 1971.

9. D. Feldman & J. Bratton. On the Relativity of Giftedness: An Empirical Study. Research Report #8. Aug., 1970. (American Educational Research Annual Conference, N. Y., February, 1971).

10. R. Rubin & B. Balow. Prevalence of School Learning & Behavior Disorders in a Longitudinal Study Population. Research Report #9. October, 1970. (Exceptional Children, 1971, 38, 293-299).

11. R. Rubin. Sex Differences in Effects of Kindergarten Attendance on Development of School Readiness and Language Skills. Research Report #10. October, 1970. (Elementary School Journal - in press.)

12. R. Bruininks and W. Lucker. Change and Stability in Correlations Between Intelligence and Reading Test Scores Among Disadvantaged Children. Research Report #11. October, 1970. (Journal of Reading Behavior, 1970, 2, 295-305)

13. R. Bruininks. Teaching Word Recognition to Disadvantaged Boys with Variations in Auditory and Visual Perceptual Abilities. Research Report #12. November, 1970. (Journal of Learning Disabilities, 1970, 3, 30-39)

14. R. Bruininks & C. Clark. Auditory and Visual Learning in First Grade Educable Mentally Retarded in Normal Children. Research Report #13. November, 1970. (American Journal of Mental Deficiency, in press)

15. R. Bruininks & C. Clark. Auditory and Visual Learning in First-Third-, and Fifth-Grade Children. Research Report #14. November 1970.

16. D. Moores. Education of the Deaf in the United States*, Occasional Paper #2. November, 1970. (Moscow Institute of Defectology, 1971, Published in Russian)

17. J. Rynders. Industrial Arts for Elementary Mentally Retarded Children: An Attempt to Redefine and Clarify Goals. Occasional Paper #3. January, 1971.

18. D. Feldman. Map Understanding as a Possible Crystallizer of Cognitive Structures. Occasional Paper #4. January, 1971. (American Educational Research Journal, 1971, 3, 484-502) AERJ Nov. 1971

19. P. Broen & G. Siegel. Variations in Normal Speech Disfluencies. Research Report #15. January, 1971 (Language & Speech, in press)

20. D. Feldman, B. Marrinan, & S. Hartfeldt. Unusualness, Appropriateness, Transformation and Condensation as Criteria for Creativity*. Research Report #16. February, 1971. (American Educational Research Association Annual Conference, New York, February 1971)

21. D. Moores. Neo-Oralism and the Education of the Deaf in the Soviet Union. Occasional Paper #5. February, 1971. (Exceptional Children, January, 1972)

22. R. Bruininks & J. Rynders. Alternatives to Special Class Placement for Educable Mentally Retarded Children. Occasional Paper #6. March, 1971. (Focus on Exceptional Children, 1971, 3, 1-12)

23. J. Turnure, S. Larsen, & M. Thurlow. Two Studies on Verbal Elaboration in Special Populations I. The Effects of Brain Injury II. Evidence of Transfer of Training. Research Report #17. April 1971.

24. D. Moores. Recent Research on Manual Communication. Occasional Paper #7. April, 1971. (Keynote Address, Division of Communication Disorders, Council for Exceptional Children Annual Convention, Miami Beach, April, 1971).

25. D. Moores. An Investigation of the Psycholinguistic Functioning of Deaf Adolescents. Research Report #18. May, 1971. (Exceptional Children, May, 1970, 36, 645-652).

26. G. Siegel. Three Approaches to Speech Retardation. Occasional Paper #8. May, 1971.

27. M. Thurlow & J. Turnure. Mental Elaboration and the Extension of Mediational Research: List Length of Verbal Phenomena in the Mentally Retarded[1]. Research Report #19. June, 1971.

28. R. Bruininks, T. Glaman, & C. Clark. Prevalence of Learning Disabilities: Findings, Issues, and Recommendations. Research Report #20. June, 1971. (Presented at Council for Exceptional Children Convention, Miami Beach, April, 1971).

29. J. Turnure & S. Larsen. Outerdirectedness in Educable Mentally Retarded Boys and Girls. Research Report #21. September, 1971.

30. A. Taylor, M. Josberger, & J. Knowlton. Mental Elaboration and Learning in Retarded Children[1]. Research Report #22. September, 1971. Mental Elaboration and Learning in EMR Children[1]. American Journal of Mental Deficiency, 1972 in press.

31. W. Bart & P. Krus. An Ordering-Theoretic Method to Determine Hierarchies Among Items. Research Report #23. September, 1971.

32. A. Taylor, M. Josberger, & S. Whitely. Elaboration Training and Verbalization as Factors Facilitating Retarded Children's Recall. Research Report #24, October, 1971.

33. J. Turnure & M. Thurlow. Verbal Elaboration and the Promotion of Transfer of Training in Educable Mentally Retarded. Research Report #25. November, 1971.

34. S. Samuels. Attention and Visual Memory in Reading Acquisition*. Research Report #26, November, 1971.

35. S. Samuels. Success and Failure in Learning to Read: A Critique of the Research. Occasional Paper #9. November, 1971. (In M. Kling, the Literature of Research in Reading with Emphasis on Models, Rutgers University, 1971).

36. D. Moores & C. McIntyre. Evaluation of Programs for Hearing Impaired Children: Progress Report 1970 - 1971. Research Report #27, December, 1971.

37. J. Turnure & M. Thurlow. Verbal Elaboration Phenomena in Nursery School Children[1]. Research Report #28. December, 1971.

22. R. Bruininks & J. Rynders. Alternatives to Special Class Placement for Educable Mentally Retarded Children. Occasional Paper #6. March, 1971. (Focus on Exceptional Children, 1971, 3, 1-12)

23. J. Turnure, S. Larsen, & M. Thurlow. Two Studies on Verbal Elaboration in Special Populations I. The Effects of Brain Injury II. Evidence of Transfer of Training. Research Report #17. April, 1971.

24. D. Moores. Recent Research on Manual Communication. Occasional Paper #7. April, 1971. (Keynote Address, Division of Communication Disorders, Council for Exceptional Children Annual Convention, Miami Beach, April, 1971).

25. D. Moores. An Investigation of the Psycholinguistic Functioning of Deaf Adolescents. Research Report #18. May, 1971. (Exceptional Children, May, 1970, 36, 645-652).

26. G. Siegel. Three Approaches to Speech Retardation. Occasional Paper #8. May, 1971.

27. M. Thurlow & J. Turnure. Mental Elaboration and the Extension of Mediational Research: List Length of Verbal Phenomena in the Mentally Retarded[1]. Research Report #19. June, 1971.

28. R. Bruininks, T. Glaman, & C. Clark. Prevalence of Learning Disabilities: Findings, Issues, and Recommendations. Research Report #20. June, 1971. (Presented at Council for Exceptional Children Convention, Miami Beach, April, 1971).

29. J. Turnure & S. Larsen. Outerdirectedness in Educable Mentally Retarded Boys and Girls. Research Report #21. September, 1971.

30. A. Taylor, M. Josberger, & J. Knowlton. Mental Elaboration and Learning in Retarded Children[1]. Research Report #22. September, 1971. (Mental Elaboration and Learning in EMR Children[1], American Journal of Mental Deficiency, 1972 in press.)

31. W. Bart & P. Krus. An Ordering-Theoretic Method to Determine Hierarchies Among Items. Research Report #23. September, 1971.

32. A. Taylor, M. Josberger, & S. Whitely. Elaboration Training and Verbalization as Factors Facilitating Retarded Children's Recall. Research Report #24, October, 1971.

33. J. Turnure & M. Thurlow. Verbal Elaboration and the Promotion of Transfer of Training in Educable Mentally Retarded. Research Report #25. November, 1971.

34. S. Samuels. Attention and Visual Memory in Reading Acquisition*. Research Report #26, November, 1971.

35. S. Samuels. Success and Failure in Learning to Read: A Critique of the Research. Occasional Paper #9. November, 1971. (In M. Kling, the Literature of Research in Reading with Emphasis on Models, Rutgers University, 1971).

36. D. Moores & C. McIntyre. Evaluation of Programs for Hearing Impaired Children: Progress Report 1970-71. Research Report #27, December, 1971

37. J. Turnure & M. Thurlow. Verbal Elaboration Phenomena in Nursery School Children[1]. Research Report #28. December, 1971.